

## CLAIMS

What is claimed is:

1. A method of connecting a telephone call from a user through one of a plurality of networks where one of the plurality of networks is an internet protocol network, comprising:
  - determining a destination of the telephone call;
  - setting a first factor according to a predetermined minimum quality of service level requirement based on the destination of the telephone call;
  - receiving a second factor responsive to the quality of service provided by the internet protocol network; and
  - connecting the telephone call through the internet protocol network if the second factor is greater than the first factor, otherwise, connecting the telephone call through one of the plurality of networks other than the internet protocol network.
2. The method of claim 1, where:
  - setting the first factor further comprises setting a first transmission factor and a first reception factor;
  - receiving the second factor further comprises receiving a second transmission factor and receiving a second reception factor; and
  - connecting the telephone call further comprises connecting the telephone call through the internet protocol network if the second transmission factor is greater than the first transmission factor and the second reception factor is greater than the first reception factor, otherwise, connecting the telephone call through one of the plurality of networks other than the internet protocol network.
3. A method of connecting a telephone call through one of a plurality of networks where one of the plurality of networks is an internet protocol network, comprising:

receiving a threshold value;  
calculating a rating factor for the internet protocol network by subtracting a  
first value and a second value from a constant value,  
where the first value is 0 if the total one-way delay is less than 100  
milliseconds, and, otherwise, the first value is calculated according to  
the following equation, in which  $Ta$  is the total one-way delay:

$$25 \left\{ \left[ 1 + \left( \frac{\log(Ta / 100)}{\log 2} \right)^6 \right]^{1/6} - 3 \left[ 1 + \left( \frac{\log(Ta / 100)}{3 \log 2} \right)^6 \right]^{1/6} + 2 \right\}$$

where the second value is an empirical value derived from subjective  
measurements for a type of codec and the percentage of loss of data  
packets, and  
where the constant value is a value between about 80 and about 100; and  
connecting the telephone call through the internet protocol network if the  
rating factor is greater than the threshold value, otherwise,  
connecting the telephone call through one of the plurality of networks  
other than the internet protocol network.

4. The method of claim 3 where the received threshold value is responsive to a  
destination of the telephone call.

5. The method of claim 3 where:

receiving the threshold value further comprises receiving a transmission  
threshold value and a reception threshold value;  
calculating the rating factor further comprises calculating a transmission  
rating factor and calculating a reception rating factor; and  
connecting the telephone call further comprises connecting the telephone  
call through the internet protocol network if the transmission rating  
factor is greater than the transmission threshold value and the  
reception rating factor is greater than the reception threshold value,  
otherwise, connecting the telephone call through one of the plurality  
of networks other than the internet protocol network.

6. The method of claim 3 where receiving the threshold value further comprises receiving a desired quality level from a user, and producing a threshold value responsive to the desired quality level.
7. The method of claim 6 where the desired quality level is chosen from a plurality of quality levels comprising a first quality level and a second quality level where the first quality level is a higher level of quality than the second quality level.
8. The method of claim 7 where the threshold value is at least seventy-five percent of a maximum threshold value if the desired quality level is the first quality level, and a value between fifty-five percent and seventy-five percent of the maximum threshold value if the desired quality level is the second quality level.
9. The method of claim 8 where the plurality of quality levels further comprises a third quality level of a lower level of quality than the second quality level and where the threshold value is a value between thirty-five percent and fifty-five percent of the maximum threshold value if the desired quality level is the third quality level.
10. The method of claim 9 where the plurality of quality levels further comprises a fourth quality level of a lower level of quality than the third quality level and where the telephone call is always connected through the internet protocol network if the desired quality level is the fourth quality level.
11. The method of claim 3 where the constant value is about 94.
12. An apparatus for routing a telephone call from a user received on a line, through one of a plurality of networks where one of the plurality of networks is an internet protocol network, comprising:  
a control connected to the line that sets a first factor according to a predetermined minimum quality of service level requirement based on the destination of the telephone call;

a network monitor connected to the internet protocol network, that generates a second factor responsive to the quality of service provided by the internet protocol network;

a comparator connected to the user control and the network monitor, that compares the first factor to the second factor; and

a switch connected to the comparator, the line, and the plurality of networks, that connects the line to the internet protocol network if the second factor is greater than the first factor, otherwise, to one of the plurality of networks other than the internet protocol network.

13. The apparatus of claim 12, where:

the first factor further comprises a first transmission factor and a first reception factor;

the second factor further comprises a second transmission factor and a second reception factor; and

the switch connects the line to the internet protocol network if the second transmission factor is greater than the first transmission factor and the second reception factor is greater than the first reception factor, otherwise, to one of the plurality of networks other than the internet protocol network.

14. An apparatus for routing a telephone call received on a line, through one of a plurality of networks where one of the plurality of networks is an internet protocol network, comprising:

a control that receives a threshold value;

a network monitor connected to the internet protocol network, that calculates a rating factor for the internet protocol network by subtracting a first value and a second value from a constant value, where the first value is 0 if the total one-way delay is less than 100 milliseconds, and, otherwise, the first value is calculated according to the following equation, in which  $T_a$  is the total one-way delay:

$$25 \left\{ \left[ 1 + \left( \frac{\log(Ta / 100)}{\log 2} \right)^6 \right]^{1/6} - 3 \left[ 1 + \left( \frac{\log(Ta / 100)}{3 \log 2} \right)^6 \right]^{1/6} + 2 \right\}$$

where the second value is an empirical value derived from subjective measurements for a type of codec and the percentage of loss of data packets, and

where the constant value is a value between about 80 and about 100;

a comparator connected to the control and the network monitor, that compares the threshold value to the rating factor; and

a switch connected to the comparator, the line, and the plurality of networks, that connects the line to the internet protocol network if the second factor is greater than the first factor, otherwise, to one of the plurality of networks other than the internet protocol network.

15. The apparatus of claim 14, where the received threshold value is responsive to a destination of the telephone call.

16. The apparatus of claim 14, where:

the control further receives a transmission threshold value and a reception threshold value;

the network monitor further calculates a transmission rating factor and calculating a reception rating factor; and

the switch further connects the telephone call through the internet protocol network if the transmission rating factor is greater than the transmission threshold value and the reception rating factor is greater than the reception threshold value, otherwise, connecting the telephone call through one of the plurality of networks other than the internet protocol network.

17. The apparatus of claim 14, where the control further receives a desired quality level from a user, and producing a threshold value responsive to the desired quality level.

18. The apparatus of claim 17, where the desired quality level is chosen from a plurality of quality levels comprising a first quality level and a second quality level where the first quality level is a higher level of quality than the second quality level.
19. The apparatus of claim 18, where the threshold value is at least seventy-five percent of a maximum threshold value if the desired quality level is the first quality level, and a value between fifty-five percent and seventy-five percent of the maximum threshold value if the desired quality level is the second quality level.
20. The apparatus of claim 19, where the plurality of quality levels further comprises a third quality level of a lower level of quality than the second quality level and where the threshold value is a value between thirty-five percent and fifty-five percent of the maximum threshold value if the desired quality level is the third quality level.
21. The apparatus of claim 20, where the plurality of quality levels further comprises a fourth quality level of a lower level of quality than the third quality level and where the telephone call is always connected through the internet protocol network if the desired quality level is the fourth quality level.
22. The apparatus of claim 14, where the constant value is about 94.
23. A method of connecting a telephone call from a user through one of a plurality of networks where one of the plurality of networks is an internet protocol network, comprising:
  - receiving a first transmission factor from the user to set a minimum transmission quality of service level;
  - receiving a first reception factor from the user to set a minimum reception quality of service level;

receiving a second transmission factor responsive to the transmission quality of service provided by the internet protocol network;  
receiving a second reception factor responsive to the reception quality of service provided by the internet protocol network; and  
connecting the telephone call through the internet protocol network if the second transmission factor is greater than the first transmission factor and the second reception factor is greater than the first reception factor, otherwise, connecting the telephone call through one of the plurality of networks other than the internet protocol network.

24. The method of claim 23, where the first transmission factor and the first reception factor are responsive to a destination of the telephone call.

25. The method of claim 23, where the first transmission factor and the first reception factor are chosen from a plurality of subjective quality of service levels.

26. An apparatus for routing a telephone call from a user received on a line, through one of a plurality of networks where one of the plurality of networks is an internet protocol network, comprising:  
a user control that receives a first transmission factor from the user to set a minimum transmission quality of service level, and receives a first reception factor from the user to set a minimum reception quality of service level;  
a network transmission monitor connected to the internet protocol network, that generates a second transmission factor responsive to the transmission quality of service provided by the internet protocol network;  
a network reception monitor connected to the internet protocol network, that generates a second reception factor responsive to the reception quality of service provided by the internet protocol network;

a comparator connected to the user control and the network monitor, that compares the first factor to the second factor; and  
a switch connected to the comparator, the line, and the plurality of networks, that connects the line to the internet protocol network if the second transmission factor is greater than the first transmission factor and the second reception factor is greater than the first reception factor, otherwise, to one of the plurality of networks other than the internet protocol network.

27. The apparatus of claim 26, where the first factor is responsive to a destination of the telephone call.
28. The apparatus of claim 26, where the first factor is chosen from a plurality of subjective quality of service levels.